

AMENDMENTS TO THE CLAIMS

Claims 1 – 41 cancelled

42. (Original) A deposit mechanism for deposit of biological fluid dots in an array, comprising a pin supported by a flexure, a source of biological fluid for deposit, and a driver engaged to drive the pin to enable reciprocal motion constrained, between retracted and extended positions depending upon the position of the driver.

43. (Original) The apparatus of claim 42 including a discrete local fluid supply for the pin.

44. (Original) The apparatus of claim 43 in which a member defines a generally annular fluid retention surface, and the deposit pin is constructed to move within the annular retention surface from retracted to extended positions, in the retracted position the deposit end of the pin being retracted from the lower surface of fluid retained by the annular surface of the storage device, and in the extended position the deposit end of the pin being projected beyond the lower surface of the retained fluid.

45. (Original) The apparatus of claim 44 in which a driver is arranged to move the annular member generally downwardly beyond the deposit end of the pin to a replenishment position.

46. (Original) The apparatus of claim 45 in which the flexure-mounted pin and the member defining an annular retention surface are associated with respective drivers.

47. (Original) The apparatus of claim 45 in which the pin and member are movable as an assembly to a station for cleaning, and to a replenishment region in which the member is replenished from a selected source.

48. (Original) The apparatus in which at least four pin and annular member assemblies according to claim 45 are clustered for movement together transversely over the substrate.

49. (Original) The apparatus in which two or more deposit pins according to claim 44 are grouped together for movement by a single drive and a corresponding number of members

defining annular fluid retention surfaces according to claim 44 are associated respectively with respective pins, the members driven by a single drive member.

50. (Original) An apparatus for deposit of fluid samples in a dense array of mutually isolated dots, comprising a deposit device, a source of fluid for the deposit device, mechanism for moving the deposit device relatively over an array of spaced apart deposit locations of a receiving substrate, mechanism for repeatedly moving the deposit device, relatively toward and away from the receiving substrate to deposit respective drops of fluid at respective deposit locations on the substrate, a cleaning system, and a control system adapted to control relative movement of the deposit device between a resupply relationship to the source, a depositing relationship to the substrate and a cleaning relationship to the cleaning system.

51. (Original) The apparatus of claim 50 wherein the source includes a fluid storage device relative to which the deposit device repeatedly moves to resupply the device during the deposit of the isolated drops of fluid.

52. (Original) The apparatus of claim 51 in which the fluid storage device is a mobile local fluid storage device generally movable with the deposit device over the array of deposit locations, the fluid storage device being constructed and arranged to locally resupply the deposit device during its deposit sequence.

53. (Original) The apparatus of claim 52 in which the local storage device is constructed and arranged to be replenished from a remotely located relatively large reservoir.

54. (Original) The apparatus of claim 53 in which the reservoir is constructed to store a multiplicity of isolated fluid volumes, the apparatus constructed to move the local supply device to a selected fluid volume of said reservoir for replenishment.

55. (Original) The apparatus of claim 53 constructed to produce relative resupply movement between the deposit device and the local storage device for the deposit of each discrete drop.

56. (Original) The apparatus of claim 52 in which the local supply device is driven to enter a supply well and having a surface adapted to retain a supply of fluid by surface tension or capillary effects.

57. (Original) The apparatus of claim 40 in which a retaining surface of the local supply has surface roughness of at least 1000 microinch.

58. (Original) The apparatus of claim 41 in which a member has an inner annular surface having the surface roughness.

59. (Original) The apparatus of claim 44 in which the member has an outer surface that is generally cylindrical.

60. (Original) The apparatus of claim 44 sized and constructed to enter a well of a PCR plate and extract fluid by surface position or capillary efforts for supply to the deposit device.

Claims 61 – 71 cancelled

72. (Original) Apparatus for deposit of fluid samples in a dense array of mutually isolated dots on a receiving surface comprising a deposit pin, a fluid source for repeatedly providing a drop of fluid on the end of the deposit pin, mechanism for moving the pin relatively over an array of spaced apart deposit locations of a receiving substrate, mechanism for repeatedly moving the pin, relatively, toward and away from a targeted point on the receiving substrate to deposit respective drops of fluid at respective deposit locations on the receiving surface, and means for stopping movement of the depositing pin toward the targeted point on the receiving surface while fluid remains between the end of the pin and the receiving surface.

73. (Original) The apparatus of claim 72 in which said means comprises a compliant system that limits the motion of the pin in response to resistance force transmitted to the pin.

74. (Original) The apparatus of claim 73 in which the resistance force is predetermined to be less than the total displacing force required to cause the pin to displace the fluid so much that the pin makes solid contact with the receiving surface.

75. (Original) The apparatus of claim 74 in which a spring system mounting the deposit pin limits the force with which the deposit pin presses toward the receiving surface.

76. (Original) The apparatus of claim 75 in which the deposit pin is coupled to the driver

by a weak spring of selected spring value.

77. (Original) The apparatus of claim 76 in which the strength of the spring is selected to enable the deposit pin to cease movement toward the receiving surface before termination of movement of the driver.

Claim 78 cancelled

79. (Original) The apparatus of claim 73 in which the compliant system including a leaf spring or flexure.

80. (Original) The apparatus of claim 76 in which the weak spring is supported on a relatively stiff spring engaged by the driver for moving the deposit pin.

81. (Original) An apparatus comprising a deposit pin constructed and arranged to deposit a first dot upon a substrate and thereafter, in registration, to deposit a second dot upon the first dot.

82. (Original) The apparatus of claim 81 in combination with a source of multiple fluids comprising a first fluid for said first dot and a second fluid for the second dot, the first and second fluids selected to potentially interact.

83. (Original) The apparatus of claim 81 including a device for depositing a large spot of a given reagent and a device for depositing dots of smaller size of different reagents upon the deposited large dot.

84. (Original) A fluid deposit arrayer for transferring a drop of fluid to a substrate by engaging the drop with the substrate, the device mounted on a compliant spring for compliant engagement with the substrate and incorporating a motion damping member.

85. (Original) The fluid deposit arrayer of claim 84 in which the spring comprises a flexure mounting.

86. (Original) The arrayer of claim 85 in which at least one portion of the flexure mounting comprises a composite in which a layer of flexible damping material is bonded to a

flexure member.

87. (Original) The arrayer of claim 86 in which a pair of flexure members are bonded together in a composite sandwich containing a layer of damping material.

88. (Original) The arrayer of claim 86 in which the flexible damping layer comprises a rubber or rubber-like compound.

89. (Original) The arrayer according to claim 87 in which at least one of the flexure layers of the composite is a resilient plastic layer.

90. (Original) The arrayer according to claim 89 in which at least one of the flexure layers comprise polyamide.

91. (Original) The arrayer according to claim 87 in which one of the flexure layers comprises a spring metal and the other layer comprises a bonding material having damping characteristics.

92. (Original) The arrayer according claim 85 in which the flexure is a planar flexure about 8mm in width and between about 20 and 25mm in length.

93. (Original) The arrayer according to Claim 87 in which a layer of flexible resin is laminated by rubber cement to a flexible metal layer.

94. (Original) The arrayer of claim 84 in which a deposit pin is mounted upon a pair of parallel flexures.

95. (Original) The arrayer of claim 94 in which at least one of the flexures comprises spring metal, and the other comprises, at least in part, a material having greater dampening properties than said spring metal.

96. (Original) The arrayer of Claim 94 in which each parallel flexures comprise a lamination according to claim 93.

97. (Original) The arrayer of claim 84 having a natural frequency greater than about

10HZ.

98. (Original) A deposit head including at least two flexure mounted pins, and a single actuator arranged to move the pins simultaneously from supply to deposit positions, the head mounted for lateral movement in both X and Y axes.

99. (Original) The deposit head of 98 in which the pins are spaced apart 9mm.

100. (Original) A deposit head including at least two flexure mounted pins, each associated with its own actuator to be moved independently from supply to deposit position, the head mounted for lateral movement in both X and Y axes.

101. (Original) The deposit head of claim 100 in which the pins are spaced apart 9 mm.

102. (Original) An aliquot carrier defining a fluid-retaining aperture through which a deposit device can transit to pick up a drop of fluid to be deposited, internal surfaces defining said aperture having a surface roughness that increases its wettability.

103. (Original) The carrier of claim 102 in which the surface roughness is produced by a technique selected from the class of sanding, broaching, machining, screw or knurl forming, coating or forming the surface of particles that provide surface roughness as by sintering or molding.

104. (Original) The carrier of claim 102 in which the surface roughness is at least 100 microinch.

105. (Original) A process of printing comprising, under computer control, moving at least one flexure mounted pin to selected X,Y positions, and depositing with said pin, a desired material.

106. (Original) The method of claim 105 in which the material is an ink or dye.

107. (Original) The method of claim 106 in which the material is a photoresist material.

108. (Original) The method of claim 105 in which the material is a varnish or encapsulant.

109. (Original) A method of causing a biological compound to interact with another substance at a predetermined position on a substrate the step comprising depositing at least one of the compound or reagent in a precisely determined localized spot relative to the substrate by mechanically lowering a compliant pin, to which a drop of the compound or reagent is adhered by surface tension, toward the substrate until the drop contacts the substrate or a pre-applied compound on the substrate with the pin executing a controlled force of less than a gram thereon, and thereafter mechanically lifting the pin away from the substrate under conditions in which the fluid drop transfers to the substrate or the pre-applied compound on the substrate.

110. (Original) The method of claim 109 in which drops of both the compound and the other substance are successively deposited by the technique of claim 92.

111. (Original) The method of claim 109 in which the pin, when approaching the substrate, applies a force to the substrate with a force of about 0.5 grams.

112. (Original) The method of claim 109 in which the compliant pin is mounted upon a support by flexures that constrain the pin to substantially linear motion relative to the support, and moving the support carrying the flexures and pin toward the substrate in an overtraveling linear motion parallel to the direction to which the pin is constrained to deflect, during which motion the pin engages the substrate or pre-applied compound on the substrate, and the flexures deflect in response to resistance encountered by the pin, thereby cushioning the contact of the pin.

113. (Original) The method of claim 109 in which a supply of the biological compound or substance to be deposited by the pin is supported above the substrate at the deposit location within a ring by surface tension, and the pin is lowered through the ring in the manner that a relatively small drop of the reagent from the supply is adhered to the end of the pin by surface tension.

114. (Original) The method of claim 109 in which the fluid to be deposited from fluid selected the group of fluids described in the specification.

115. (Original) The method of depositing a biological fluid with a pin comprising supporting fluid within a ring by surface tension, and the pin is lowered through the ring in the

manner that a relatively small drop of the reagent from the supply is adhered to the end of the pin by surface tension.